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IS 15083 (2001): Water Swivel for Use with Diamond Core Drilling - Requirements [MED 21: Diamond Core and Waterwell Drilling]

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Indian Standard

WATER SWIVEL FOR USE WITH DIAMOND CORE DRILLING — REQUIREMENTS

ICS 73.100.30

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

November 2001 **Price Group 3**

Diamond Core and Water Well Drilling Sectional Committee, ME 21

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Diamond Core and Water Well Drilling Sectional Committee had been approved by the Mechanical Engineering Division Council.

This standard is intended to initiate the technical requirements, performance and application of water swivel assemblies deployed for diamond core drilling operations as normally practiced for mineral exploration and sinking of similar bore holes for other applications.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

Indian Standard

WATER SWIVEL FOR USE WITH DIAMOND CORE DRILLING — REQUIREMENTS

1 SCOPE

This standard covers a typical shape, form and features of basic components, material requirements and area of application of water swivels for diamond core drilling.

2 REFERENCES

The following standards contain provisions, which through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
554 : 1999	Dimensions for pipe threads where pressure tight joints are required on the threads (*fourth revision*)
1875 : 1992	Carbon steel billets, blooms, slabs and bars for forging (*fifth revision*)
4431 : 1978	Carbon and carbon manganese free cutting steels (*first revision*)
5517 : 1993	Steels for hardening and tempering — Specification (*second revision*)
5932 : 1999	Rolling bearing-thrust bearings-boundry dimensions, general plan (*first revision*)
6455 : 1972	Specification for single row radial ball bearings
6456 : 1972	Specification for double row radial ball bearings
6603 : 1972	Stainless steel bars and flats
10208 : 1982	Diamond core drilling equipment

3 APPLICATION

A water swivel is a device used for sending water/drilling fluid through the drill string to the bit when the string is rotating at high speed. It connects the stationary drilling hose from the flush pump and the rotating drill string. A pipeline from the flush pump is normally laid up to a suitably located point nearest to the drill head. The drilling hose of suitable length connects the pipeline and the water swivel fitted at the top of the drill string. The drilling fluid is pumped through the water swivel down the drill string which is rotated at required speeds for drilling a bore hole.

4 RATING

4.1 For safe and economic drilling, the water swivel shall be able to safely carry the weight of the drill string even while rotating at high speed. A water swivel is normally rated by the following parameters:

a) Size of drill string normally used for drilling,

b) Load carrying capacity,

c) Maximum rotational speed during continuous operation, and

d) Maximum working pressure.

Size	*AW/BW*	*NW/HW*
Load capacity, kg	5 000	10 000
Maximum spin, rpm	1 500	1 000
Maximum, working pressure, kg/cm^2	70	70
Drilling fluid	Water/mud	Water/mud/foam
Hose connections, mm	38	50
Overall weight, kg (excluding adopter)	8	13.6

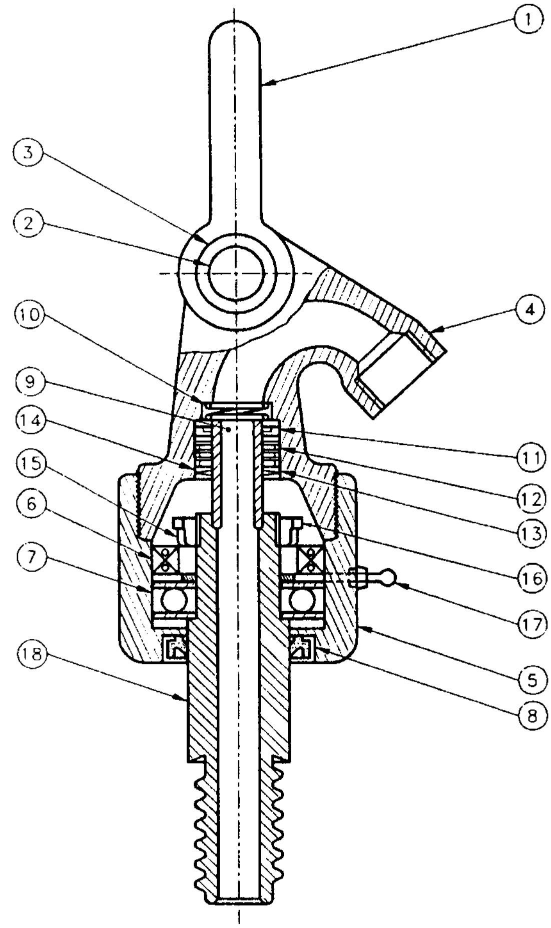
4.2 The testing pressure shall be double the maximum working pressure.

NOTE — Nomenclature AW/BW and NW/HW is as given in IS 10208.

5 GENERAL REQUIREMENTS

5.1 Heavy Duty Water Swivel

A typical illustration of heavy duty water swivel is given in Fig. 1.



Sl No.	*Description*
1.	Bail
2.	Pin
3.	Washer
4.	Body, goose neck
5.	Bearing housing
6.	Double row radial ball bearing
7.	Single direction thrust bearing
8.	Grease seal
9.	Wash pipe
10.	Spring
11.	Upper spacer
12.	Packing set
13.	Lower spacer
14.	Retaining ring
15.	Lock washer
16.	Lock nut
17.	Grease fitting
18.	Spindle

FIG. 1 TYPICAL ILLUSTRATION OF WATER SWIVEL — HEAVY DUTY

5.1.1 The upper housing (Bail housing) shall have an eyelet at its top, integrally cast capable to withstand loads as per rating. The eyelet shall have a suitable gunmetal bush of appropriate wall thickness. It shall also have integrally cast goose neck (Fluid inlet opening) at 45° angle having threads conforming to IS 554 and to match the end connection of the delivery hose. A detachable pin-to-pin hexagonal nipple shall be fitted with the gooseneck. The lower end of the bail housing shall have left hand threaded pin connection of adequate strength to hold its lower counterpart alongwith the drill string.

5.1.1.1 The bail housing shall be manufactured by fabrication instead of casting. Manufacturing bail housing by casting (without reduction in strength) is optional.

5.1.2 The lower housing shall be of suitable dimension precisely machined to house the spindle wash pipe and bearing assembly. A grease fitting is suitably located for lubricating the bearing. A grease seal shall be provided at the bottom of the housing to prevent the leakage of the lubricant.

5.1.3 *Bail*

Bail of appropriate size shall be made by forging. It shall connect to the bail housing with a pin (shaft) of adequate size and strength.

5.1.4 *Main Swivel Assembly*

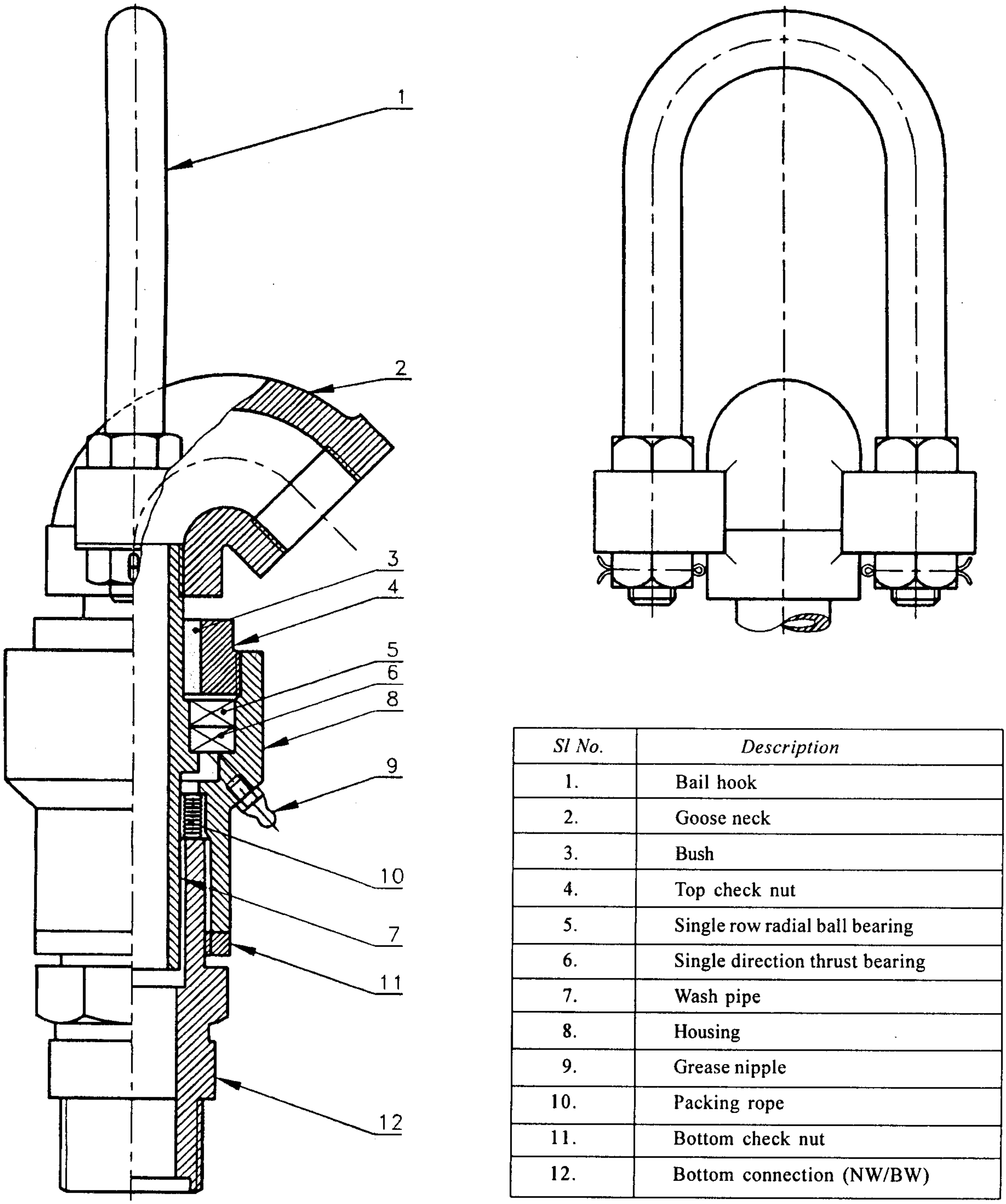
One double row ball bearing of 70 millimetres nominal bore diameter according to IS 6456 and one single direction thrust bearing of 70 millimetres nominal bore diameter with diameter series 1 according to IS 5932 shall be provided to take care of radial as well as axial load. The spindle shall be precisely machined corresponding to bearing. The inside diameter of the spindle shall not be less than the inside diameter of wash pipe. The spindle shall have left hand threads at the top to accommodate locking nut and washer. The bottom end shall have left hand threads for additional adaptor to be provided for drill rod connection.

5.1.5 *Wash Pipe*

Wash pipe is press fitted to the top of the spindle to provide access to the drilling fluid from gooseneck to the drill string through spindle bore. The 'V' packing kit is mounted on the external surface of the wash pipe and is housed in the upper housing. The packing is held in position by a coil spring of appropriate size and strength.

5.2 Medium Duty Water Swivel

A typical illustration of medium duty water swivel is given in Fig. 2.



Sl No.	Description
1.	Bail hook
2.	Goose neck
3.	Bush
4.	Top check nut
5.	Single row radial ball bearing
6.	Single direction thrust bearing
7.	Wash pipe
8.	Housing
9.	Grease nipple
10.	Packing rope
11.	Bottom check nut
12.	Bottom connection (NW/BW)

FIG. 2 TYPICAL ILLUSTRATION OF WATER SWIVEL — MEDIUM DUTY

5.2.1 The bail shall be of rigid type and of approximately 250 millimetres length. It shall be made preferably from 22 millimetres mild steel round. It shall be fitted to the goose neck hub with check nuts and cotter pins on both sides. The gooseneck shall be integrally cast having an angle of 45° with the main axis and shall have threads according to IS 554 and to match the end connection of the hose.

5.2.2 The top check nut shall have left hand threads and screwed to the housing. A bush of 5mm thickness shall be provided in the inner bore. The graphite rope in between the wash pipe and the housing shall be held in position by tightening the bottom connection to the housing.

5.2.3 The wash pipe shall be precisely machined corresponding to the bearing size. The wash pipe shall have left hand threads at the top and shall be screwed to the goose neck. It shall be made from stainless steel according to IS 6603.

5.2.4 One single row radial ball bearing of 50 millimetres nominal bearing bore diametrer according to IS 6455 and one single direction thrust bearing of 50 millimetre bore diameter with diameter series 1 according to IS 5932 shall be provided to withstand 4 to 5 tonnes of thrust load.

5.2.5 Bottom connection shall have left hand threads to be screwed to the body and suitable rod threads (NW/BW) at the lower end.

NOTE — Nomenclature NW/BW is as given in IS 10208.

6 MATERIALS

6.1 The bail shall be made from forging steel according to IS 1875.

6.2 The upper housing (Bail housing) shall be preferably cast or otherwise fabricated from 40C8 steel (*see* IS 5517) or equivalent steel.

6.3 The spindle shall be made from 40 Cr4 or 42 Cr 4 Mo2 steel according to IS 5517 or equivalent steel.

6.4 Wash pipe shall be made from 07 Cr 18Ni9 grade stainless steel according to IS 6603.

6.5 Pin shall be made from mild steel (*see* IS 4431) and size shall be as per load capacity.

7 MARKING

The water swivel shall be marked with the following information:

a) Name or trade mark of the manufacturer,

b) Size capacity of water swivel,

c) Maximum working pressure, and

d) Size of drill string used for drilling.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Diamond Core and Water Well Drilling Sectional Committee, ME 21

Organization	*Representative(s)*
Geological Survey of India, Kolkata	Shri B. Kumar (***Chairman***) Shri R. Sundararajan (*Alternate* I) Shri V. K. Kansal (*Alternate* II)
Atlas Copco (India) Ltd, Pune	Shri S. Datta Majumdar
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United Nations Children's Fund, New Delhi	Shri Vishwas Joshi Shri Arun K. Mudgil (*Alternate*)
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